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George Woodrow

Mango

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The Mango

By G. Marshall Woodrow

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R.K. Blizzard
"ALPHONSE"

THE MANGO:

ITS CULTURE AND VARIETIES.

BY

G. MARSHALL WOODROW, F.R.H.S.,

Formerly Professor of Botany, College of Science, Poona.

"The choicest fruit of Hindostan."

—*Amir Khrussu.*

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PREFACE.

THE MANGO in its finer varieties has such exquisite flavor and other properties that are universally appreciated, and the tree is so hardy and prolific, thriving in great variety of soil and climate when treated with the most elementary skill; and there are so many Mango trees of inferior quality occupying soil that would produce the best sorts, fit to preserve and trade with after the local consumption is satisfied, that there is ample field for a short account of the means by which a desirable improvement may be brought about and in which every one endowed with love of country may share.

G. MARSHALL WOODROW.

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AGRICULTURE

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THE MANGO.

THE MANGO: HISTORY AND DISTRIBUTION.

THE Mango is an errant member of a family whose home is in Malaya; including the Mango and its near relations, eleven species of the genus Mangifera grow in that humid region, but our subject, the most illustrious of the family, *Mangifera indica*, has spread in a semi-wild form throughout the tropical world, and is cultivated as far afield as Florida, Queensland, Natal, and the Canary Islands. The most ancient literature of India records its presence, and in comparatively recent times, while Tuglak Shah was on the throne at Delhi (A.D. 1325-1351), the Turkoman poet, Amir Khrussu, wrote in Persian verse:—"The Mango is the Pride of the Garden, the choicest fruit of Hindustan; other fruits we are content to eat when ripe, but the Mango is good in all stages of growth." (Dymock, *Pharm. Ind.*, I. 382.)

From this long connection and the grand specimens of the tree which occur on the hill ranges of India, about 1000 to 3000 feet altitude, notably the one which evidently gives name to the village *Yekambi* (one Mango tree), in N. Kanara, 17 feet 8 inches in girth, at chest-height from the ground in 1902, and another at *Peint*, which measured 16 feet at a similar height above the ground in 1898, both having proportionate height and spread of branches, have been assumed to be truly indigenous notwithstanding affinity with its obscure relations in Malaya. The name Mango used in western literature is probably a corruption of the Tamil *Manga* or of the Sundian *Mang,ga.**

Lady Brassey has described the Mango as "the King of Fruits—a combination of Apricot and Pine-apple," and the best sorts certainly

* The Mango is named as follows:—*Amb*, *Am* (Hindi); *Amba* (Marathi); *Ambo* (Gujerati); *Mango-maram* (Tamil); *Mavu* (Canarese); *Ma* (Malabari); *Nazkyak* (Persian); *Ambaj* (Arabic).

have a subtle blending of many agreeable flavors, but the common seedling tree bears fruit in which a mixture of tow, turpentine, and treacle is usually prominent, and some of the sorts that are greatly valued by those who have lived with them from childhood are very disagreeable to strangers. The best sorts are without fibre in the pulp, and are eaten with a spoon, like custard, but some fibrous sorts are celebrated for delicious piquant flavor, and are eaten by sucking the pulp pressed out through a hole in the skin. It is to sorts of this kind that the facetious tales of eating Mangoes in a bath-room are due, the best sorts being as fit for the dessert-table as a peach or a pear.

Like other plants that are widely cultivated, the Mango has infinite variety of form, from the monarch of the forest at Yekambi to mature dwarfs less than the height of a man, or with prostrate branches adapted to make "weeping" trees, if grafted to a vigorous stem at considerable height from the ground.

The size of the fruit is as variable as the flavor. *Punalha*, a much appreciated sweet variety, weighs 3 ounces; *Ladhiano* weighs 3 pounds; and *Inerna*, which is 4 pounds in weight, are grand examples of cooking-fruits; but the finer dessert sorts average 8 ounces. The high-class varieties have all an agreeable odor, but *Pia-posha*, a very rare Poona variety, has such sweet perfume and glowing white and pink shades of color that it is valuable for decorative effect without other considerations. The unripe Mango, *Keri* of the Indians, pickled, is much used used as a relish, and has valuable antiscorbutic properties ascribed to it by medical authorities, as may be expected from its analysis showing nearly "25 per cent. of free acid, chiefly malic and tartaric, in the air-dry substance."—(Dr. Lyon, in *Pharma. Ind.*, I. 384.) The valuable coloring matter, Indian Yellow, when genuine, is obtained from the urine of cattle fed on Mango leaves; and the timber of the tree, although of coarse grain, is tough and durable when not exposed to weather.

The possibilities of the Mango at the hands of the expert preserve maker with modern appliances are boundless, and hitherto have been only touched by the Indian housewife making a jujube-like preparation called Amras, Amaut, or Ambapoli, from the pulp, expressed, mixed with spices, spread in a thin sheet and dried in the sun—the special solace and delight of Indian students while in foreign countries—or Mango Chutney, a preparation in which Mango is only one of the large number of highly-flavored substances, and the proportion of ingredients varies with the taste of every housewife.

The following well-known Indian receipt for MANGO CHUTNEY is published in the *Bulletin* of the Botanical Department, Jamaica :— Three pounds common mangoes (turned, but not ripe); 3 pounds tamarinds; 2 pounds raisins (weighed after stoning); 8 pounds brown sugar; ½ pound chilies; 2 pounds green ginger; ½ pound garlic or 1½ pounds onions; ¼ ounce mace; 1 ounce mustard seed; ¼ ounce cloves; ¼ ounce pimento; ½ pound table salt. Soak the tamarinds in 2 quarts of the best vinegar, stir them about with a wooden spoon to get the pulp off, and take out the seeds and the leathery part in which they are inclosed. Cut the raisins small. Peel the ginger and grate it. Pound the chilies, garlic, and mustard seed in a mortar, using a little of the vinegar to moisten. Mix all together thoroughly; it is then ready for use.

To make a commercial success of Mango growing, large plantations of a few select sorts are necessary, and other crops should be entirely restricted to the first five years of growth while the Mango trees are developing and occupying the soil, except a few crops of the Pea family that may be grown to plough into the soil as manure.

CLIMATE FOR THE MANGO.

The Mango tree grows freely in all tropical or sub-tropical climates with a mean shade temperature of from 75° F. to 80° F. with a normal minimum above freezing point and abundant moisture either in the atmosphere or at the root. A few degrees of frost for a short time destroys the leaves and young branches, and an occasional blizzard giving 10° F. below freezing point for a short time may destroy branches as thick as the forearm, but on these being pruned off, the trees are little the worse for the low temperature.

A rainfall of from 50 to 100 inches yearly, and falling chiefly from June till the end of September, is suitable, but the rainfall may be much less if irrigation be available or the trees be planted near tanks, so that the roots may find water by extending downward, as occurs in Sind.

The Mango is an accommodating tree, provided sufficient warmth be available, and has been grown successfully from the Canary Islands to Queensland, and even in the conservatories at Kew and in the Glasgow Botanic Gardens good specimens of the tree may be seen; but, unfortunately, seedling trees of poor quality abound wherever the climate is suitable, and lower the general impression of the value of the fruit. A visit to a store of ordinary seedling Mango

fruit during hot, moist weather is often sufficient to induce a life-long dislike to the fruit, but a single example of the *Pia-posha* sort is as attractive as a fragrant rose.

SOIL FOR MANGO TREES.

Baji-Rao Peshwa (A.D. 1796-1818) planted large numbers of Mango trees in the neighbourhood of Poona. It is said that he had long caravans employed to bring seeds from Goa, and of the plantations he made, a few still remain to show the soil desirable for Mango cultivation and incidentally the poor quality of the average Mango fruit raised from seed. The old Mango *tope* (grove) on the banks of the Mula river near Ganesh Khind is part of the exalted planter's work, and the section of a well dug in the plantation shows 5 feet of alluvial loam ; a soil washed from the Western Ghats and deposited on the banks of the stream, 7 feet of marl, a mixture of clay and lime, and 5 feet of coarse gravel ; and another well in the plantation at Khed-Sivapur a few miles south of Poona, which is said to have 5000 trees, shows 5 feet of dark brown loam, 9 feet of marl, 2 feet of gravel, and 3 feet of very porous *muram*, a disintegrated form of trap rock. It is not often that such perfectly constituted soils for producing trees are available, and fruit of the highest quality may be produced on a loamy soil 3 feet in depth containing 5 to 10 per cent. of lime and enough peroxide of iron to give the soil a reddish tinge, in addition to the usual ingredients of a fertile soil as disclosed by the production of good crops of staple products or luxuriant natural vegetation of mixed character and not dense enough to crack deeply during dry weather as occurs in the black soil of the Deccan. Maries writes that there are fine Mango trees yielding good crops on *Khankar*, or soil having a large proportion of lime nodules, at Gwalior.

HOW AND WHERE TO PLANT THE MANGO.

The Mango tree is often planted in a garden, and expected to yield valuable crops while competing with other plants for food and water. It *grows* freely under such conditions and occasionally yields a crop by chance, but for proper cultivation it requires and deserves to have the soil devoted to it alone ; any other crop on the ground should be confined to the first five years after planting the trees, during which time the Mango trees are attaining maturity, but after

that time irrigation during the cold season which may be necessary for the shallow rooted garden plants will probably keep the Mango trees growing and prevent the maturation of flower-buds which are necessary for the production of fertile flowers. Crops grown between mature trees should be of a nature fit to enrich the soil and keep down weeds, by the crop being ploughed into the soil as manure; among such crops are *Tag* or *Sunn* (Crotolaria juncea), *Chana* or *Harbara* (Cicer arietinum), *Mút*, *Talka-pyre* or *Kheri*, (Phaseolus aconitifolius) *Pessahi*, *Mug* or *Urid* (Phaseolus mungo), or other members of the Pea family which bear tubercles on the roots, inhabited by bacteria, which apparently assist the assimilation of uncombined nitrogen from the atmosphere.

Regarding the distance apart which should be retained for Mango trees, there is much difference of opinion, 30 feet apart is usually recommended, but the space which a grafted tree can fully occupy depends so much on the nature of the soil that it is not desirable for a particular distance to be laid down as a rule. The writer considers that the earlier that the whole of a plot is given up entirely to the fruit which is the principal occupant, the better, and that 20 feet apart is sufficient for the best varieties during many years on average soils, and should the soil induce extra strong growth, every alternate tree may be transplanted easily and safely. Grafted trees have a tendency to a bushy habit of growth, and the destructive action of the larva of the tiger-moth often requires large branches to be cut out, so, on the whole, more profit per acre is to be obtained by planting trees 20 feet apart than at a greater distance, there being less space to be filled by secondary crops after fruit-bearing has set in, there is less watering during the cold season, and consequently more regular flowering and fruit-bearing. Pits for planting may be dug 3 feet in each dimension, the upper portion of the soil being kept apart from the remainder, and about 20 lbs. weight of bones as fresh as are procurable may be placed at the bottom of each pit, and the soil on the margin to a depth of 9 inches may be drawn inward, burying all grass and weeds, and treading the loose soil regularly, so that the sinking which ensues may be general; should this be neglected one side may sink more than another, and the tree get out of perpendicular. The surface soil mixed with manure may then be placed in the pit, sufficient to bear the upper roots about an inch lower than the margin of the pit, and fine soil should be packed carefully among the roots, and the remainder of the soil arranged in a *thala*—a circle round the tree, so that the heavy watering to be

given immediately will sink near the root, and assist the general subsidence. Firm stakes and shade are desirable during the following six months, and the intervening land may be cultivated with moderately irrigated and richly manured crops until the trees have attained flowering size. Should young vigorous plants, which have not been long confined in pots, not be available, weakly plants may be planted as above, and about five Mango seeds set near the plant, these will soon grow vigorously, and the best may be grafted to the weakly tree and the others pulled out.

The Flower of the Mango Tree.

A, the solitary pollen bearing stamen. B, the style having the stigma at the free end and the large globular ovary at the base. C, are petals having three or five yellow streaks and alternating glands at the base.

The flowers of the Mango shown enlarged in the figure are individually about $\frac{1}{8}$-inch diameter, but are produced in large much-branched panicles from the ends of strong branches of the previous season. Each flower has only one fully developed stamen, and if the hot cloudy weather which accompanies thunder-storms and turns milk sour occurs while the trees are in blossom, the flowers mostly wither and fall off without fertilization, and in consequence the crop is scanty. The general flowering season is from January to March and ripening from May till August, but varieties flower and ripen at all seasons.

MANGO TREES FROM SEED.

In some districts an impression prevails that high-class Mango trees may be produced by soaking the seed in honey and watering with milk, but nature objects to such methods, and the number of seedling Mango trees of the highest class existing in India will give little trouble to enumerate. Some fruit trees such as the Orange yield very good fruit from seed of good sorts that has been produced in large plantations of one kind of Orange, but the kinds of Mango

that are most highly valued are outstanding, aberrant forms which occur in very low proportion among trees raised from seed. New and valuable sorts may be obtained by enclosing the young flowering branch of a high-class Mango in a muslin bag to prevent indiscriminate cross-fertilization, and either leaving the flowers to fertilize themselves or assisting fertilization by applying the pollen from another high-class sort to the stigmas of the fruit-bearing tree with a camel-hair pencil; the probability of seed produced by the process, giving high-class fruit is much increased. The seeds obtained by fertilization in this manner may be planted in sandy soil of poor quality with abundant irrigation, and while the stem is soft and pliable it may be very gently twisted round a stick and tied in that position; early development of flowers, and sufficient fruit to disclose the quality will ensue, and thereafter grafting to a vigorous stock will restore normal growth if the new variety be considered worth attention.

MANURE FOR MANGO TREES.

While the tree is young, abundant farmyard manure is desirable; it induces rapid development, so that when the tree begins to bear it produces a quantity of fruit that repays the necessary guarding from parrots, although the time of beginning to bear may be retarded somewhat. While planting Mango trees, it is recommended to bury large quantities of crude bones in the pits: this is from the assumption that such bones are very much cheaper than when crushed, and that the nitrogen in such is much higher than any preparation of bones contains, and that nitrogenous manure at a depth of two feet in the soil is not attractive to the dung beetle, which in the larval form destroys the roots of many plants. The mineral compounds of nitrogen, nitrate of potash (saltpetre), nitrate of soda (chile saltpetre), and sulphate of ammonia, have a special value in not being attractive to the voracious grub, and if applied by driving a crowbar into the ground at intervals in a circle 1–5 feet from the stem of the tree, placing the manure in the holes and covering with soil, there is little danger of the manure being washed out of the ground by a tropical shower. In any case, nitrogenous manure must be applied freely while the trees are young, and this is generally effected by manuring the intervening space with poudrette, dry fish offal (fish guano), cow-dung, or large quantities of town sweepings, and planting vegetable or root crops, or lucerne, with irrigation. When the trees have

commenced bearing it is advisable, as previously stated, to sow crops of the Pea family and plough in the entire crop so as to enrich the soil and keep down weeds.

Washing Mango trees in a 2 per cent. solution of sulphate of iron, is beneficial in removing surface fungi and supplying soluble iron.

The Mango growers near Mazagon, Bombay, who produced such famous fruit before the land was occupied with cotton mills, applied 10 pounds of salt to each tree at the end of September: this would arrest growth during October and November, and encourage the formation of flower buds. In a moist climate, and the intervening ground occupied with irrigated crops, this system is highly commendable, but with a dry climate is unnecessary.

VILLE'S MANURE FOR FRUIT TREES:—

Calcic superphosphate, - -	528	lbs. per acre,
Potassic nitrate, - - - -	440	„ „
Calcic sulphate, - - - -	352	„ „
	1320	„ „

IRRIGATION OF THE MANGO.

While the trees are young it is desirable to cultivate crops requiring abundant manure and water in the interspace, so that the Mango trees may be of a size fit to bear a considerable quantity of fruit when an age of five years is attained, and the produce will repay the necessary expense in protecting the crops from birds and other vermin; but when fruiting age is attained there need be no necessity for irrigation from the time the rain ceases in September till the flowers have "set," that is, till the young fruit appears; thereafter, irrigation over the area covered by the branches once in fifteen days or so is desirable while the fruit is increasing in size, but may be discontinued when ripening approaches. As the tree increases in size, the *feeding roots*, or young fibres, extend outward, and are usually most active at the same distance from the centre as the ends of the branches, hence the effect of applying manure and water near the stem of the tree becomes less in proportion to the outspread of branches. The surface soil should always be kept in a loose, friable state, to cause the water to pass downward instead of running off, and should it appear that water does not penetrate freely, the preparation of trenches for lateral percolation of water may be necessary.

PROPAGATION OF THE MANGO.

RAISING "STOCKS" FOR GRAFTING UPON.—If water be scarce it may save labour to prepare the planting pits as above noted and sink in each a new earthenware water-pot—new pots are porous and the object is to permit the water to percolate slowly. Near the pot several fresh Mango seeds may be planted, and the pot filled with water at intervals of ten days or so. The pot should be dry several days before it is refilled, and its mouth should be covered so that mosquitos may not breed in the water, and fresh manure may be placed in the pot with advantage, its nutritive principles will pass freely through the sides of the pot. When the seedlings have grown some time, one with a smooth bark and vigorous growth may be retained and the others pulled up; by this contrivance the tap root passes downward into the soil deep enough to get water long after the rainy season has passed, and when one year old the selected plant may be grafted a few inches above the ground or lower if skill be available. The whip graft or the saddle graft described later are the most suitable for stocks of this kind.

WHEN STOCKS ARE REQUIRED FOR ENARCHING, it is advisable to arrange a large number of seeds in a single layer on a hard rock or sheet of galvanised iron, cover the seed with 4 inches of leaf-mould or sand and keep moist; by this arrangement the tap root is turned aside, fibrous roots are freely developed, and when the first growth has become firm the young tree may be pulled up without injury to the root and the most vigorous ones planted in globular thin-walled earthenware pots having mouths about 3 inches in width termed *murka*; there is little necessity for making a hole in the bottom of such pots, the sides being thin and porous superfluous water does not remain in the pot, and the small mouth is often an advantage when it is necessary to set the pot off the vertical in enarching, and those pots may be arranged on stages round a Mango tree of good quality and the seedling plants enarched in large numbers. Some of the trees in the writer's charge had 500 stocks enarched at one time, and the illustration attached, for which thanks are due to Dr. Fairchild, shows the work in progress at the Empress Garden at Poona.

TERMS USED IN GRAFTING.

In grafting a few special terms are used. *Stock* (Fig. 1 A) implies the common seedling Mango tree upon which the superior variety is to be grafted. *Scion* (Fig. 1 B) is the term given to the part of the superior kind which is to be united to the stock. *Cambium layer* is a very thin line of cells between the wood and the bark that are in active growth during the growing season of the tree and cause a union of the tissues of the Stock and Scion.

Having read the previous note on *Terms*, it will be easily understood that the

ESSENTIALS IN GRAFTING are, to bring the cambium of two very closely allied plants, such as different kinds of Mango, together, bind the parts so as to exclude air and water, and keep the plants healthy during a short growing season. The simplest form of grafting, termed Enarching, may be successfully accomplished without any experience further than may easily be obtained from the following page. So little skill is required for enarching that the writer has shown Hindu boys how to do the work, and practice for half-an-hour was sufficient for success.

FIG. 4.

Grafting by Approach.

In the simplest form of enarching a slice is cut from the side of a branch, deep enough to expose the cambium for a length of 2–4 inches, and a slice of a *similar size* may be cut from the stem of a young seedling Mango tree, in a pot which is supported at a convenient height on a simple erection, the two cut surfaces are bound together with a strip of fibre from the stem of the banana or other bandage, and covered with well-kneaded clay to keep out air and water; it is then necessary to keep the soil in the pot moist, and after 6-8 weeks union is effected. Enarching may be accomplished at any season in tropical climates, but the most practical time is the cold weather, except in the extreme northern or southern limits of Mango cultivation, where the middle of the rainy season is the most favorable time, the storms which issue the monsoon being over. The "graft" is by some people permitted to remain attached to the large tree for an indefinite time, and the result is swellings at the point of union from the construction of the bandages, and an unsightly union which may be avoided by removing the "graft" early

Enarching the Mango, Empress Garden, Poona, India.

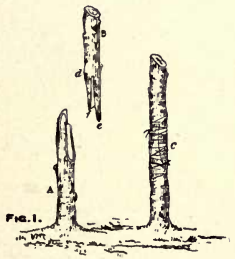


Fig. 1.

Whip or Tongue grafting

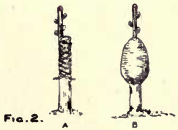


Fig. 2.

Mode of Tying and Clasping Graft.

Fig. 3.

Crown or Rind-grafting.

and placing it in moist shade for a few weeks. When it is found that union is complete, the bandage should be *completely* removed and replaced by another bandage, not very tightly applied, to permit swelling; after a few months, careful dressing-off snags with a sharp knife will induce a clean stem and finish the graft.

In the above description the essentials are given, but as the cambium layer is the point of union, it is evident that to increase the area of this tissue brought into contact, is to increase the success of the union; this is effected by making two tongue-like projections from each of the two surfaces to be united, the one tongue so placed that it fits neatly into the recess formed by the other.

The age of the stock in enarching need not be a definite quantity. Stocks of three weeks old and also three years old have been very successfully used, as far as union is concerned; but, as the root of the tree suffers from confinement in a pot, it is advisable to retain the cramped condition as short a time as possible. Seeds planted in June-July produce fine strong plants for stocks by the end of November, which may be grafted during the two succeeding months, and being kept in shade during the hot season, will be ready to plant out during July following. By this course vigorous trees are produced, which start into growth freely, and in due season bear a crop worth attention. A large, old graft that has been several years in a pot may yield a few Mangoes a year or two earlier than the freely-grown tree, but a few Mangoes do not repay the cost of protection from birds, etc., and the root that was cramped in a pot will probably yield to the first strong breeze that strikes the tree.

A very simple PLANT-SUPPORT for layering or enarching, used in the Calcutta Botanic Gardens, is formed of a bamboo inserted vertically in the ground sufficient to remain firm, and split into four parts, about 18 inches in length at the upper end. A cord round the bamboo prevents further splitting, and the parts being separated, the pot is inserted, and remains firmly held.

After practice at enarching, a desire for something more scientific and practicable at a distance from the tree of good quality, arises: for this the true graft provides. The stocks having been raised as previously described, and being about one or two years old, and vigorous plants with healthy foliage, a scion is selected of the wood of the previous season * and of the same thickness as the stock; a

* Wood of the previous season has pale brown bark and is as thick as a man's thumb.

few inches above the ground the knife is inserted from one side and made to cut the stem of the stock down the centre : the scion being cut at the lower end into the form of a wedge, is placed in the slit in the stock, the bark and cambium of both being neatly in contact, it is bound up and covered with clay very carefully, so that no rain or irrigation water may gain access to the wound, and the clay being made to cover the top of the scion but to leave a couple of inches of bark uncovered ; the clay and graft are then wrapped in grass so as to remain moist, the leaves of the stock remain to continue their duty. This system is specially desirable in moist climates, and a shower of water on the grass is occasionally necessary to keep the clay moist and prevent it from cracking. In dry climates, the whip or tongue graft as shown in Fig. 1 is desirable, the graft being covered with a large flower-pot, and the pot covered with grass kept moist to prevent the sun from drying the graft before cohesion has taken place.

A very popular system, however, is the Crown Graft, because the stock may be of almost any age. Smooth bark trees are found to have tough, pliable bark, and are best for this purpose. The season extends from July to January. This system is illustrated and all the tools displayed in the figure Crown Grafting. No. 1 is a box bearing a lump of clay, a grafting-knife, a secateur, or shears, and a smooth bone for raising the bark—it is actually the handle of a tooth-brush with a smooth, sharp point; 2, a saw, to cut the head from the stock ; 3, the large inverted flower-pot, to protect the graft from dry air ; 4, the stock, with the scion inserted ; 5, a sheet of glass to admit light to the graft through the broken bottom of the flower-pot ; 6, the cut-off stem of the stock, with the sharpening-stone and bunch of *sopat* or *raphia* fibre with which to tie the graft, complete the picture.

The operation is conducted thus :—The head of the stock being removed, the knife is applied about 6 inches from the top of the remaining stump, the point pressed through the bark and drawn upward, cutting a straight line completely through the bark with the least possible injury to the subjacent tissue. At the top the bark is raised gently from the wood with the point of the knife, and the smooth bone inserted between the wood and the bark and pressed downward ; this raises the bark and the scion is placed in the aperture and gently pressed downward, its lower end having previously been cut for a space of 4–6 inches in the form of a long wedge, having the inner face plane or hollowed in the centre,

Crown Grafting the Mango.

and the outer face slightly rounded so that the cambium of both stock and scion may be in contact as much as possible. The bark at the edges of the long wedge-shaped cut on the scion should be retained, and in pressing the scion into its place the greatest care should be exercised to prevent those two strips of bark from being pushed off and the cambium layer of the scion destroyed.

By expert operators more than one scion may be inserted, but the work must all be done with celerity and the wound bandaged thoroughly and covered with prepared clay to exclude air and water, then closed up with the inverted flower-pot and covered with grass to keep cool. After a few weeks leaves will shoot from the scion, and the graft may be gradually inured to the open air by removing the shade in the afternoon and replacing next morning.

Inexperienced operators will find it advisable to cut the head off the stock about 3 feet from the ground, then if the first attempt is not satisfactory 6 inches more may be cut off, and so on until practice has induced skill enough to produce satisfactory work.

"BUDDING" THE MANGO.

That the Mango could be propagated by bud-grafting or "budding," has long been the faith of every one who has studied the habits of the tree, and the writer made many attempts in India to accomplish this desirable process, without success; but a suitable method has been discovered by Mr. Knight in Queensland, who published his results in the Queensland *Agricultural Journal*, July-September, 1900, and it was also discovered independently by Mr. W. G. Oliver in Florida, who published his method in the *Florists' Exchange*, New York, April, 1902. There is no material difference in the systems employed by the fortunate operators, who are voted the heartiest congratulations of all who know the subject of their work. The following is Mr. Oliver's description of his process of Bud-grafting:—

"The method I wish to call attention to must be performed under certain conditions, the first and most important of which is that the stock must be in active growth. The best time is when the new leaves are not far enough developed to show the bright green color. The bark is then most easily removed. Choose the thick part of the stem only a few inches above the surface of the ground; cut out a rectangular piece of bark about 1½ inches in length, and from the variety to be propagated cut a similar piece with a bud in the centre, not, however, from new wood, but from that which is at least two

years old and which has lost its green color and assumed the grayish brown tint. Fit the section of bark, with bud attached, into the space formed by the removal of the bark from the stock. If this piece of bark removed from the stock has a bud in the central part, the wood exposed to view will fit better with the section of bark to be applied. When the section has been put in place, with a small brush apply a light coating of liquid grafting-wax in which there is a large quantity of resin, to the cut parts, and immediately tie firmly with thick pieces of raffia (*sopat*); then an 8-inch wide strip of strong wrapping paper wound round and round the stem a few inches above the bud, and tied above with a cord, completes the operation for the time being.

"If good material is selected and the operation carefully carried out at the proper time, there is no reason why a high percentage of successful unions should not be secured."

Branches from which suitable bark for budding may be taken will bear carriage by post during about eight days if packed in an air-tight case with moist earth or cocoa-nut fibre.

Grafting Wax is made by melting together equal parts by weight of Rosin, Beeswax, Lard, and Turpentine over a slow fire, stirring thoroughly and with care not to upset into the fire. In its absence a paraffin candle melted and applied with a brush will be found a useful substitute.

TRANSPLANTING MANGO TREES.

If the tree be only one or two years old and has not been transplanted previously, the root will consist of a single vertical tap root (termed *nul** by the Maratha gardeners) having a few small fibres; and its successful removal needs special care. The surrounding earth should be removed, carefully leaving a "ball" of soil 15 inches in depth and 8 inches wide at the top, but tapering downward, left in contact with the root; this should have a number of laths ranged round it and tied firmly together before the excavation is finished, so that the "ball" or *hundi* may be moved without breaking. This being carried to the prepared site is placed in position and sufficient soil packed round its base to keep the ball steady before the cord and laths are removed, and the remainder of the soil liberally mixed *with manure being firmly packed around,* and a hollow left at the top, abundant water is given at once to be followed at intervals by sufficient to keep the soil moist until assurance of safety is

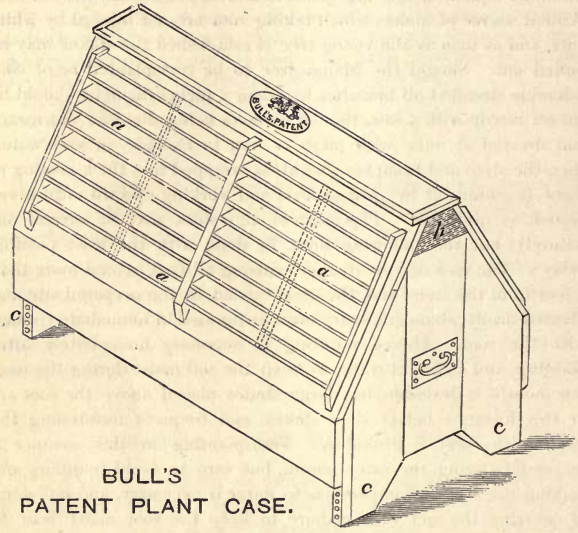
* Pronounced as in "*null and void.*"

apparent. Immediately after planting, three stakes may be inserted 12 inches from the tree and brought together at the top; to these the tree is made fast, and banana leaves or other shading material may be tied. For staking, *Yeda-ouse,* Saccharum procerum is specially suitable: a plant of this large grass in a corner of the garden is a convenient source of stakes which taking root are not injured by white ants, and as soon as the young tree is established the stakes may be pulled out. Should the Mango tree to be transplanted be of considerable size, first all branches less than 2 inches diameter should be cut off neatly with a saw, the cut surfaces being directed downward and dressed at once with pitch or wax to exclude air and water, then the stem and branches should be wrapped in a thick coating of straw, beginning at the ground level and working upward until every branch is protected. This part of the work may be carried out leisurely, but the following must be done with the least possible delay:—The root may be dug out, cutting all that extend more than 2 feet from the stem, and the tree carried to the prepared site and planted firmly, abundant sharp sand being used in immediate contact with the root. Heavy watering is necessary immediately after planting, and sufficient water to keep the soil moist during the next few months is desirable, but large stones placed above the root are in this instance better than stakes, and frequent moistening the straw with spray is desirable. Transplanting in this manner is successful during the rainy season, but care to avoid puddling and making the wet soil impervious to water is necessary, and mulching or covering the soil with manure to keep the root moist *must be avoided* wherever the dung beetle occurs, that is almost universally in hot climates.

TRANSPORT OF MANGO TREES OVER SEA.

Grafted Mango trees in pots bear transport over sea with very slight loss if firmly fixed in a Wardian Case, of which an improved form by Messrs. W. Bull & Sons, Plant Merchants, Chelsea, London, is figured below by the courtesy of the firm. Plants have been carried all over the world during many years in this case; and in a case nearly similar the writer has despatched grafted Mango plants from India to Florida and Queensland, and found they arrived in safety. Bull's case has louvres (*a*) which admit light, yet keep out direct sunshine and protect the glass. Slight ventilation

through perforated zinc is provided at the ends (*b*), and stout feet (*c*) keep the case several inches above the deck of the ship so that sea water is not injurious. The case should stand on deck in a place where light is abundant yet direct tropical sunshine is avoided.



BULL'S
PATENT PLANT CASE.

GATHERING AND SWEATING THE MANGO.

The Mango is gathered as soon as the fruit comes away freely in the hand. A slight softening at the shoulder is sometimes apparent, and when a fruit is ripe the gush of sap that comes out from the hilum of the fruit quickly dries up and becomes a drop of gum. Fruit gathered in proper condition ripens without shrivelling, and the Mango sweated and ready for table is a charming object with glowing colour, smooth surface, and most attractive odor. When gathered too early the sap exudes freely, does not agglutinate, and the fruit shrivels. The collection of the fruit should be by hand as far as practicable : a bag-net with the mouth distended by a circle of cane, and suspended by a strap from the shoulder, leaves both

hands free to gather. None must be allowed to fall to the ground; all should be handled as gently as eggs because a slight bruise brings on decay quickly. To bring down the higher fruit a bag-net 15 inches in depth, the mouth distended by a circle of cane, traversed by and bound to a light bambu and having a piece of hoop iron bound across the mouth of the bag at right angles to the bambu, forms an efficient apparatus for the purpose; the hoop iron breaks the stalk, and the fruit falls into the net and is gently lowered to the ready baskets. It is then carried to the fruit room and arranged in single layers, with soft dry grass above and below. The room must be well ventilated and cool, yet not subject to decided changes of temperature: a moist atmosphere hastens ripening and decay, coolness and fresh air retard destructive changes.

For transport, small baskets fit to contain a dozen Mangoes should be provided, each with a lid and some hay for packing at top and bottom. Each basket should be filled so as to prevent motion of the fruit, choice specimens being separately wrapped in soft paper. Twelve small baskets may be packed firmly into one large one, and the load becomes sufficient for a man to carry when the basket has been raised on to his head. By this means bruised and damaged fruit is reduced to the lowest term, and repacking for distribution is avoided.

ENEMIES OF THE MANGO TREE.

The Mango is subject to attacks of several species of caterpillar, which are especially injurious to immature trees by eating up the young growth and inducing the formation of groups of twiggy branchlets that are unfit to continue the axial growth, and by other grubs which are developed from eggs that have been injected into the tender shoots and cause a bulging of the mature shoots, often accompanied by a longitudinal crack in the bark, which increases with the growth of the tree, and is a constant source of weakness. Such bulged shoots should be cut off and thrown into fish-ponds, and crows should be permitted to gather grubs without molestation.

Aphids occasionally occur in such numbers that the tree is weakened and the leaves coated with excretion, a varnish-like, viscid, sweet covering called honey-dew. If the aphids be observed early, great benefit may be obtained from a shower of soap-suds having 1 per cent. of kerosene thoroughly mixed with the water, and

if the leaves be mature, a 2 per cent. solution of sulphate of iron in water will assist in cleaning the trees by destroying fungus spores.

Parasitical plants of the *Loranthus* family (*Bhangul*) must be cut off as soon as they appear, as they take up sap required for the growth of flower-buds or fruit.

Rats destroy Mango seedlings by eating the base of the plant for the pith. Arsenic or *shendure*, mixed with butter and flour, and placed around the plants, will attract the rats and cause them to avoid the neighbourhood.

PRUNING THE MANGO.

The Mango blossoms come in large panicles, chiefly at the ends of strong branches developed during the previous rainy season and thoroughly ripened during the autumn, and also occasionally from dormant buds on the larger branches, therefore little pruning is necessary beyond the removal of all weakly or crowded shoots and branchlets that bulge from the presence of grubs in the pith or the further development of the same destructive action, shown by larger branches with rugged, broken bark and wood, pervaded by the canals of wood-boring caterpillars. The removal of branches is also sometimes desirable in grafted trees to produce symmetry and enable all parts of the tree to share equally in the flow of sap. Pruning should be effected at the end of the rainy season, and all wounds must be immediately covered with warm pitch or with *shen*—the preparation of 1 part cow-dung and 2 parts loamy soil, with sufficient water—which is used for dressing earthen floors: if renewed at short intervals, the latter preparation is as effective as any—but unremitting attention is necessary until the wounds are entirely covered with bark. The saw is the best implement for heavy pruning, and the knife or secateur for small branches.

FAMOUS MANGOES.

In the following notes it is assumed that the fruit is on the table, the stalk scar directed outward, and the "beak" or insertion of the stigma (B) to the left: the left shoulder (L.S.) then, is on the same side as the beak. R.S. means, right shoulder.

Afonza, of Goa.—*Weight,* 18 oz.; *size,* $4\frac{5}{8}$ in. by $3\frac{7}{8}$ in.; *skin,* greenish yellow with dark specks; *pulp,* very pale yellow, very sweet, slightly woolly. L.S. high; B. slight.

Alphonse, Kirkee.—Figured on the frontispiece. *Weight,* 12 oz.; *size,* 4 in. by $3\frac{1}{4}$ in.; *skin,* greenish yellow with reddish orange shoulder; *pulp,* fine dark cream-coloured of the finest piquant and delicate flavor. B. none; L.S. very slight. The keeping qualities of this fruit are excellent, and it is generally admitted the best of all Mangoes. The name is applied in the markets to many distinct sorts of greatly varied merit.

Amiri, or Amircola of Nowsari.—*Weight,* 10 oz.; *size,* $5\frac{1}{2}$ in. by $2\frac{7}{8}$ in.; *skin,* crimson yellow on shoulder shading to green downward. Described as a very high-class fruit by Mr. Mahaluxmivalla of Bombay.

Badshaha, Poona.—*Weight,* 14 oz.; *size,* $4\frac{3}{4}$ in. by $3\frac{3}{8}$ in.; *skin,* pale yellow; *pulp,* pale yellow, of agreeable flavor but woolly. B. small; Shoulders level.

Banchore of Alandi-Keir, Poona.—*Weight,* $4\frac{3}{4}$ oz.; *size,* 3 in. by $2\frac{1}{2}$ in.; *skin,* deep crimson on exposed, dark cream on shaded side; *pulp,* very fine creamy, delightfully piquant. B. none; Shoulders level.

Banchore of Dhairey, Poona.—*Weight,* 7 oz.; *size,* $3\frac{1}{8}$ in. by $2\frac{3}{4}$ in.; *skin,* green, speckled pale green and shaded yellow; *pulp,* very sweet and luscious without piquancy.

Banka.—A twisted variety highly popular.

Bada-Mawa, Poona.—*Weight,* 6 oz.; *size,* $3\frac{5}{8}$ in. by 3 in.; *skin,* fruit compressed laterally, stone small; *pulp,* sweet and piquant, spongy.

Batasi, Parel, Bombay.—Mrs. R. Wadia's Garden. A very small Mango of delicious flavor and very rare, with fine fibre. B. none; L.S. very slightly higher.

Bhopaly, Hirabagh, Poona.—*Weight,* 14 oz.; *size,* 4 in. by 3⅛ in.; *skin,* yellowish green; *pulp,* deep yellow without fibre, flavor pleasing. B. none; Shoulders level.

Bhunga, *Wai,* Sattara.—*Weight,* 8 oz.; *size,* 3½ in. by 2⅞ in.; *skin,* yellow; *pulp,* yellow shaded, dark yellow in centre. Infested with Mango Weevil. B. very slight; Shoulders level.

Bishop, Goa.—*Weight,* 18 oz.; *size,* 5⅜ in. by 4¼ in.; *skin,* greenish yellow, with very small bright, light, yellow specks; *pulp,* deep brownish yellow towards the stone, shading off to pale at the outside. Slightly woolly, sweet and rich without piquancy. B. scarcely perceptible; L.S. slightly high.

Bolo, Goa.—*Weight,* 13 oz.; *size,* 4 in. by 3½ in.; *skin,* yellow; *pulp,* pale yellow, sweet, pleasant, with a few strong, dark fibres near skin. B. and S. none.

Borsha, Lohara, Pachora, Kandesh.—*Weight,* 10 oz.; *size,* 4⅛ in. by 2⅝ in.; *skin,* bright green, with minute yellow spots and rich crimson on the exposed side. B. very slight; L.S. slightly high.

Cobria, Donja, Poona.—*Weight,* 6 oz.; *size,* 2¾ in. by 2¾ in.; *skin,* smooth yellowish green; *pulp,* pale yellow, of fine flavor, no fibre. B. none; Shoulders level.

Colleça, Goa.—*Weight,* 10 oz.; *size,* 4⅜ in. by 2⅝ in.; *skin,* yellowish green; *pulp,* shaded yellow, sweet, no fibre, a cooking fruit. B. very slight and broad; R.S. very small and slightly lower than the left one.

Costa, Goa.—*Weight,* 8½ oz.; *size,* 3⅝ in. by 2⅞ in.; *skin,* yellowish green; *pulp,* cream, of pleasant flavour. B. very slight; L.S. very broad and slightly high.

Cowasji-Patel, *see* Kavasji.

Custodio, Goa.—*Weight,* 28 oz.; *size,* 6 in. by 4⅛ in.; *skin,* yellowish green; *pulp,* pale yellow, no fibre, season begins in July. B. slight: L.S. very high.

Dalbed, Wadgaon, Poona.—*Weight,* 10½ oz.; *size,* 4⅜ in. by 2⅝ in.; *skin,* yellow, with green shading; *pulp,* deep yellow, very sweet, but very fibrous. Fruit stalk insertion high; L.S. higher than right; B. medium.

Deorukhia, Wadgaon, Poona.—*Weight,* 7 oz.; *size,* 4 in. by 2½ in.; *skin,* clear orange; *pulp,* deep yellow, very fine flavor: habit, upright,

vigorous; a first-class Mango. L.S. very slightly raised; R.S. depressed; B. very slight.

DINIZ, Goa.—*Weight,* 11 oz.; *size,* $3\frac{5}{8}$ in. by 3 in; *skin,* dark green; *pulp,* yellow, very soft, creamy and sweet, without piquancy. Shoulders level; B. very slight.

DILPASSAND is a very small-leaved variety, described as of excellent quality.

D'JOAO, Goa.—*Weight,* 13 oz.; *size,* $4\frac{1}{2}$ in. by $3\frac{1}{2}$ in.. L.S. high and broad; B. none. A popular fruit.

DULCE', Goa.—*Weight,* 12 oz.; *size,* $4\frac{3}{8}$ in. by $3\frac{1}{4}$ in.; *skin,* pale greenish yellow; *pulp,* pale yellow, sweet, piquant, no fibre. Shoulders level; B. slight.

DURMA, Tirhut.—A round yellowish, Mango about 8 oz.—1 lb. in weight; has an exquisite vanilla flavor. *C. Maries.*

FERNANDEZ, Goa.—*Weight,* 6 oz.; *size,* $3\frac{1}{8}$ in. by $2\frac{1}{2}$ in.; *skin,* on on exposed side bright red, with small yellow specks gradually shading downward, and on sheltered side to yellowish green; *pulp,* bright yellow, fibre very slightly woolly, flavor very fine, sweet, and piquant. Shoulders both low; B. scarcely perceptible. A very superior sort.

FERNANDINO, Goa.—*Weight,* $9\frac{1}{2}$ oz.; *size,* $3\frac{7}{8}$ in, by $2\frac{7}{8}$ in.; *skin,* bright crimson on the upper half, shading to pale yellow at the lower end; *pulp,* very pale yellow, sweet, and of piquant flavor, but woolly, L.S level; R.S. low; B. none.

FERNANDINO II., Goa.—*Weight,* 10 oz.; *size,* $4\frac{3}{8}$ in. by $3\frac{3}{8}$ in; *skin,* green; *pulp,* white. A cooking Mango of special value. L.S. level; R.S. low; B. none.

FREDERICO, Goa.—*Weight,* 8 oz.; *size,* $3\frac{1}{2}$ in. by $2\frac{7}{8}$ in.; gathered while green; no fibre; a valuable preserving fruit. L.S. level; R.S. slightly lower; B. slight.

FURTADO, Goa.—*Weight,* $11\frac{1}{2}$ oz.; *size,* 4 in. by $3\frac{1}{8}$ in.; *skin,* smooth, green, becoming rich yellow-green; *pulp,* deep orange, puffy, rather coarse. L.S. high and broad; R.S. level; B. none.

FURTADO II., Goa.—*Weight,* 8 oz.; *size,* $3\frac{1}{2}$ in. by 3 in.; *skin,* yellow and green in blotches; *pulp,* dark yellow, flavor rather high. L.S. slightly high; R.S. slightly low; B. very distinct $\frac{1}{4}$ in.

Fusli-Bewa Mango is said by Maries to bring 1 rupee each. August is its season.

Gadgya, Bamburda, Poona.—*Weight,* 18 oz.; *size,* 4½ in. by 3⅞ in.; *skin,* greenish yellow; *pulp,* pale yellow of piquant flavor, slightly fibrous. Shoulders nearly level; B. slight but distinct.

Goa, Mango, Motibagh, Sholapur.—*Weight,* 7 oz; *size,* 3⅛ in. by 2⅞ in.; *skin,* pale yellow; *pulp,* very soft, sweet. L.S. high; R.S. low; B. none.

Goradya, Saswood, Poona.—*Weight,* 12 oz.; *size,* 4⅛ in. by 3⅞ in; *skin,* thick, very rough, with large obtuse projections; *pulp,* sweet but wooly. L.S. high; R.S. low; B. indistinguishable.

Gopalbogh, Malda, is a superior varies coming into market at the end of June. It weighs 6 oz.

Inerna, a Durbhanga variety of great size. Reported 4 pounds in weight.

Jamshedi, Nowsari, is thus described by Mr. R. K. Bhidè, the well-known Botanical artist:—*Skin,* thick, tough, shrivelled, blotched yellow and green, intruded at apex (almost like an apple). Tip rounded; B. short and strong; *pulp,* yellow with a brownish tinge, free from fibre, flavor strong, excellent, distinct.

Jeepria, Allundi, Kheir, Poona.—*Weight,* 12 oz.; *size,* 4⅜ in. by 3⅛ in.; *skin* green when brought to market; *pulp* pure white; a good cooking sort. Both shoulders low; B. none.

Kabutria, Motibagh, Sholapur.—*Weight,* 7 oz.; *size* 4⅜ in. by 2½ in.; *skin,* greenish yellow, red on shoulder; *pulp,* deep yellow, without fibre, of rich piquant flavor. Shoulders nearly level; B. small but distinct.

Kala-Alphonse.—*Weight,* 14 oz.; *size,* 4⅝ in. by 3⅜ in.; *skin,* dark green with red on shoulder; *pulp,* fine dark yellow, creamy, flavor luscious, no fibre. L.S. level; R.S. low; B. very slight obtuse.

Kavasji-Patel, Bombay.—*Weight,* 21 oz; *size,* 5¼ in. by 3¾ in.; gathered green with white pulp for cooking, no fibre; a fine large cooking sort. Both shoulders falling; B. prominent.

Khoont, Sirdar Balwantro Natu's Garden, Kadus, Poona.—*Weight,* 8 oz.; *size,* 3¾ in. by 3⅛ in.; *skin,* dull red and yellow, blotchy; *pulp,* very fine, creamy, dark yellow but puffy. A very fine fruit with an inattractive color.

KUBDIA (*Koobdia*), Donja, Poona.—*Weight*, 11 oz.; *size*, $4\frac{1}{4}$ in. by 3 in.; *skin* *pulp*, very sweet and luscious but stringy. L.S. very high; R.S. falling; B. very slight.

KALIA, Poona.—*Weight*, 9 oz.; *size*, 4 in. by $3\frac{1}{4}$ in.; *skin*, dark green, slightly yellow on shoulder; *pulp*, pale yellow, very sweet. L.S. high; R.S. low; B. distinct, small.

KAELIA, Donja, Poona.—*Weight*, 14 oz.; *size*, $5\frac{1}{2}$ in. by 3 in.; *skin*, greenish yellow; *pulp*, deep yellow, flavor luscious, fibres few. L.S. high; R.S. low; B. very slight.

KAGDI-ALPHONSE, Bombay.—*Weight*, 10 oz.; *size*, $3\frac{7}{8}$ in. by $3\frac{1}{8}$ in.; *skin*, greenish yellow suffused with crimson; *pulp*, deep yellow, fine, creamy; L.S. from the stalk slightly falling, then rising; R.S. gently falling; B. none. A thin-skinned Alphonse Mango.

KHATKIA, Bimari, Poona.—*Weight*, 7 oz.; *size*, $4\frac{1}{4}$ in. by $2\frac{5}{8}$ in.; *skin*, doubtful; *pulp*, sweet and piquant, but stringy. Both shoulders low; B. depressed. A popular Mango, to be sucked.

KUMUKHT, described by Maries, has rough skin; a large beak, is 8 oz. in weight, and of fine flavor.

LANGRA, Benares.—*Weight*, $6\frac{1}{2}$ oz.; *size*, $3\frac{5}{8}$ in. by $2\frac{5}{8}$ in.; *skin*, very thin, green, with a yellowish tinge when ripe; *pulp*, yellow, creamy, and of delicious flavor. No fibre and small stone. Both shoulders falling; B. very small. Presented by Rajah S. N. Sindia. This is MALDAH, described in *Bot. Mag.*, t. 4510.

LERRUA.—A variety described by Maries, chiefly valued for its fine colouring, orange-red in green in stripes and blotches.

MAHALUNGA, Wai, Sattara.—*Weight*, $8\frac{1}{2}$ oz.; *size*, $3\frac{5}{8}$ in. by $2\frac{7}{8}$ in.; *skin*, deep yellow and green in blotches; *pulp*, deep orange-red, sweet, highly flavored. Both shoulders high; B. very small, sharp.

MAHALUGA, Vishnu Sadashive's Garden, Poona.—*Weight*, 10 oz.; *size*, $3\frac{5}{8}$ in. by $3\frac{1}{4}$ in. laterally compressed; *skin*, ; *pulp*, woolly, flavor very agreeable, stalk scar prominent. Both shoulders falling; B. none.

MALDA.—See LANGRA.

MULGOBA, Chittur, Madras.—*Weight*, 20 oz.; *size*, 5 in. by $4\frac{7}{8}$ in.; *skin*, yellow and green, blotched; *pulp*, pale yellow, no fibre, flavor

piquant and sweet, stalk scar very prominent. L.S. level; R.S. falling; B. large, sharp. Plants of this variety were sent to Florida by the writer in 1889, and have given much satisfaction.

Moria, Donja, Poona.—*Weight,* 8 oz.; *size,* $3\frac{5}{8}$ in. by $3\frac{1}{4}$ in.; *skin,* yellowish green, reddish on shoulder; *pulp,* very sweet, slightly fibrous. L.S. broad, gently rising; R.S. falling; B. small, sharp. A good keeping sort.

Mussarata, Goa.—*Weight,* 15 oz.; *size.* $4\frac{1}{4}$ in. by $3\frac{3}{8}$ in.; *skin,* exposed side yellow, shaded side green; *pulp,* cream coloured, fine rich flavor. L.S. high; R.S. rising slightly; B. none.

Naralya, Rauze, Poona.—*Weight,* $10\frac{1}{2}$ oz.; *size,* 4 in. by $3\frac{1}{4}$ in.; *skin,* ; *pulp,* pale yellow, slightly fibrous, flavor piquant. L.S. very high and broad; R.S. falling, broad; B. very small.

Narayan Ropra, Bombay.—*Weight,* 10 oz.; *size,* $3\frac{3}{4}$ in. by $3\frac{5}{8}$ in.; *skin,* green, with yellow shading near stalk; *pulp,* deep yellow, of fine flavor but fibrous. Shoulders both falling or level; B. small.

Nawsharwani. Cultivated at Nowsari by Mr. Tata, and highly valued by that gentleman.—*Weight,* about 16 oz.; *size,* $4\frac{3}{4}$ in. by $4\frac{1}{8}$ in. Both shoulders high; B. sharp.

Nowshari, Bombay.—*Weight,* about 20 oz,; *size,* $4\frac{7}{8}$ in. by $4\frac{1}{8}$ in.; *skin,* shaded yellow on shoulder, darker downward; *pulp,* . A fine large Mango, of which definite information is wanting.

Ogee, Mangalore—A remarkable Mango presented by the late Khan Bahadur Dorabji Padumji without local name.—*Weight,* 31 oz.; *size,* $7\frac{1}{8}$ in. by $4\frac{1}{8}$ in.; *skin,* golden; *pulp,* sweet, free from turpentine but not luscious; *stone,* comparatively small. L.S. falling gently; R.S. falling abruptly; B. small but distinct.

Pakria, Poona.—*Weight,* 7 oz.; *size,* 4 in. by $2\frac{5}{8}$ in.; *skin,* pale yellow; *pulp,* pale yellow, of delicious flavor and without fibre. Both shoulders falling; B. none. The leaves are of medium size, pale green, and acute at the base.

Pandria, Donja, Poona.—*Weight,* 9 oz.; *size,* $3\frac{1}{4}$ in. by $3\frac{1}{8}$ in.; *skin,* greenish yellow; *pulp,* sweet but woolly. Both shoulders falling; B. none.

Piru, Wai, Sattara.—*Weight,* $5\frac{1}{2}$ oz; *size,* $3\frac{5}{8}$ in. by $2\frac{5}{8}$ in; *skin* green and golden.

PIA-POSHA, Bamburda, Poona.—*Weight,* 14 oz.; *size,* 5⅜ in. by 3⅛ in.; *skin,* rich cream colored, suffused crimson on the exposed side; *pulp,* pale yellow, very sweet and agreeably flavored but stringy. Both shoulders falling equally; B. large. A very showy fruit with a delightful fragrance.

PYRIE, Ganesh Khind Garden, Poona.—*Weight,* 8 oz.; *size,* 3¾ in. by 3 in; *skin,* varying from red on the shoulder to pale yellow at the beak, very brightly colored; *pulp,* soft creamy, of delicious delicate flavor. Both shoulders falling equally; stalk scar prominent; B. large. A first-class sort.

RAGU, Purandhur, Poona.—*Weight,* ; *size,* 5⅞ in. by 2⅛ in.; *skin,* yellow; *pulp,* deep yellow, flavor distinct and agreeable, no fibre. Both shoulders falling, and large depression in place of beak.

RAJIA, Donja, Poona.—*Weight,* 7 oz.; *size,* 3⅛ in. by 2½ in.; *skin* yellowish green, tinged red on shoulder; *pulp,* deep yellow, of rich sweet flavor and no fibre. L.S. level; R.S. falling; B. none.

RYOTYA, Donja, Poona.—*Weight,* 8 oz.; *size,* 3⅜ in. by 2¾ in.; *skin,* bright crimson on exposed side, creamy on shaded side; *pulp,* creamy yellow, of extra fine flavor, no fibre. Both shoulders falling equally and no beak, exactly obovate. A really fine fruit, handsome and prolific.

SAINT AIME, Goa.—*Weight,* 15 oz.; *size,* 4 in. by 4 in.; *skin,* greenish yellow; *pulp,* deep orange, of coarse grain but rich flavor. L.S. high and broad; R.S. low and broad; B. none.

SALGADA, Goa.—*Weight,* 24 oz.; *size,* 5¼ in. by 4½ in.; *skin,* greenish yellow on shoulder, shading downwards to yellow; *pulp,* dark yellow, very sweet and agreeably flavored. R.S. very high; L.S. level, then descending.

SALGADINA, Goa.—*Weight,* 7 oz.; *size,* 3⅜ in. by 2¾ in.; *skin,* rich crimson, shading to yellow; *pulp,* deep yellow. L.S. level; R.S. falling; B. none.

SHIKKA, Junir.—*Weight,* 4 oz.; *size,* 3 in. by 2⅜ in.; *skin,* deep yellow; *pulp,* deep yellow, of fine piquant flavor. L.S. rising; R.S. falling abruptly; B. place depressed.

SHAH-PASAND is a much esteemed variety said to be the same as *Malda,* and 2 lbs. in weight and of irregular shape.

Shendria, Nanded, Poona.—*Weight,* 7 oz.; *size,* $4\frac{1}{8}$ in. by $2\frac{3}{4}$ in.; *skin,* deep yellow, spotted and flushed with carmine; *pulp,* very fine, creamy and rich in flavor, with a few fibres near the skin. L.S. rising slightly; R.S. falling abruptly; B. none.

Swrawini Alphonse, Bombay.—*Weight,* 14 oz.; *size,* $4\frac{7}{8}$ in. by $3\frac{3}{4}$ in.; *skin,* yellow; *pulp,* fine deep yellow of fine flavor; *stone,* large. L.S. very broad and rising slightly; R.S. falling; B. marked by an abrupt contraction.

Sucretino, Goa.—*Weight,* 12 oz.; *size,* 4 in. by $3\frac{1}{4}$ in.; *skin,* slightly yellowish at top but deepening to green at the base; *pulp,* sweet, with an agreeable subacid flavor. Both shoulders falling; B. place slightly depressed.

Surkhya, Hirabagh, Poona.—*Weight,* 4 oz.; *size,* $3\frac{1}{8}$ in. by $2\frac{3}{8}$ in; *skin,* rich creamy yellow, with crimson speckled shoulders; *pulp,* pale cream coloured, not fibrous, but of cloying flavor. L.S. rising; R.S. falling abruptly; B. none. A very showy fruit produced in great abundance.

Timor or Timorata, Goa.—*Weight,* 20 oz.; *size,* $4\frac{1}{4}$ in. by $4\frac{5}{8}$ in. Green when brought to market. L.S. very high and broad; R.S. also high; B. none. A fine cooking sort.

Totapari, Nowsari, is thus described by Mr. Bhidè:—*Skin,* very smooth, altogether yellow, moderately tough; *pulp,* concolorous with skin slightly fibrous, flavor excellent. It measures $4\frac{7}{8}$ in. by $2\frac{7}{8}$ in. Both shoulders fall equally; B. small but distinct. The illustration is from Mr. Bhidè's drawing.

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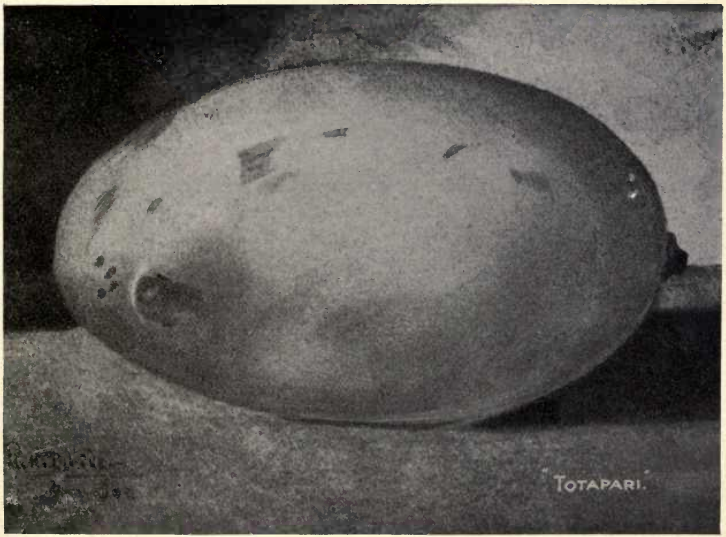

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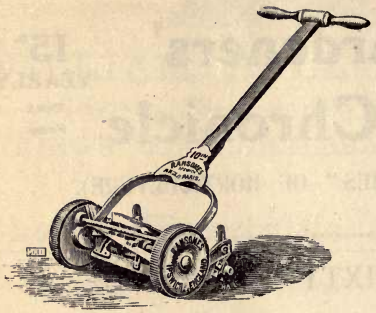

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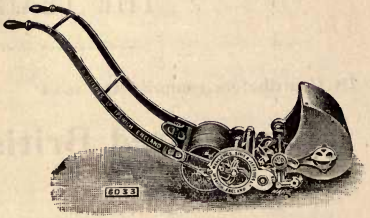

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